

**SOUTHWEST FISHERIES SCIENCE CENTER
THIRD QUARTER REPORT - FY 2005**

For the Period of April 1- June 30

Submitted by: Roger Hewitt, Division Director, Fisheries Resources Division

Title of accomplishment or milestone: Time series of daily hake (*Merluccius productus*) larval production/10 m² off California in January-April from 1951-2004.

Current status: A time series was constructed and refinement is ongoing. A manuscript is being drafted.

Background information: Pacific hake is a migratory species which occupies the west coast of the American continent from Baja California to British Columbia. Adult hake move south to spawn in autumn and move north to feed in the summer. Hake larvae live below the mixed layer in colder water and have been obtained as far offshore as 200-250 miles. Hake larvae were observed in the early CalCOFI surveys in 1949 and ranked number one in abundance in 1951 before the anchovy population began to increase, and ranked number two during the CalCOFI survey cruises from 1955-84, before the CalCOFI survey area was reduced to the current pattern. It is believed that during warm years, the spawning center is likely to move north, and vice versa. The long time series of hake larvae and distribution by month from 1951-84 were reported by Moser et. al. (CalCOFI ATLAS no 31, 1993). Since 1985, the CalCOFI survey area has been reduced to the area from San Diego to Morro Bay (Figure 1). In 2003, five sampling lines north of Morro Bay were reinstated into the CalCOFI sampling pattern in each January survey, primarily to collect hake larvae under a FY 2002 FATE (Fisheries and the Environment) proposal. In this project, we analyzed hake larval data from 1951-2004 for the area between San Diego and San Francisco in January-April, the peak spawning period.

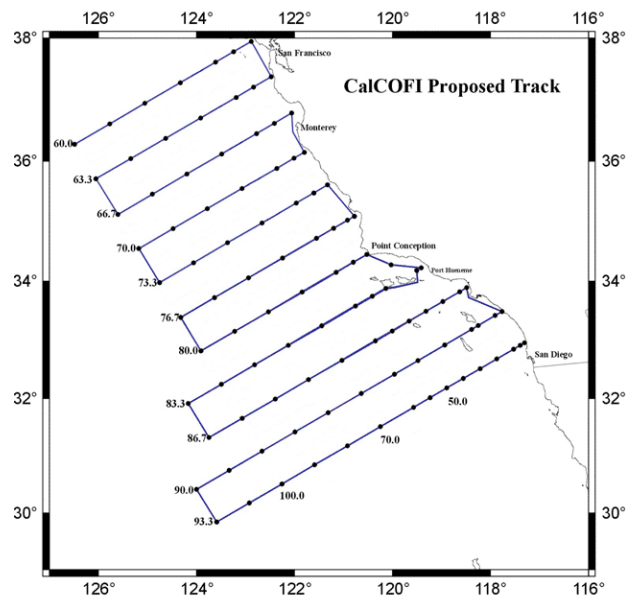


Figure 1: Survey area for each January cruise of CalCOFI since 2003.

Purpose of Activity: The objective of this project is to provide a time series of the daily hake larval production in January-April off California from 1951-present. This time series will be updated yearly.

Description of accomplishment and significant results: Our data analyses were to obtain the least biased daily larval production at hatching. All the larval data were

corrected for net extrusion and avoidance based on information from the literature. Ages were computed from larval length based on growth curves. The corrected larval abundance divided by its duration at a given length is the daily hake larval production. We used a Pareto survival curve to estimate the daily hake larval production at hatching (intercept of the mortality curve and the instantaneous mortality rate (IMR)), because it was evident that the IMR decreases as the age of larvae increases. This was done for years when surveys covered the entire historical CalCOFI area. For the years when hake larval data were collected only from San Diego to Morro Bay (southern area), the larval production for the entire area was converted from the mean larvae density from the south. The daily larval production at hatching is a better index for hake abundance than the mean density of abundance, number/10m², used in the past. We will update the larval production each year based on January and April CalCOFI surveys (Figure 2). The daily larval production/10m² off California peaked in 1987 and has been declining ever since.

Time Series of Estimated Hake Larval Production/10m²

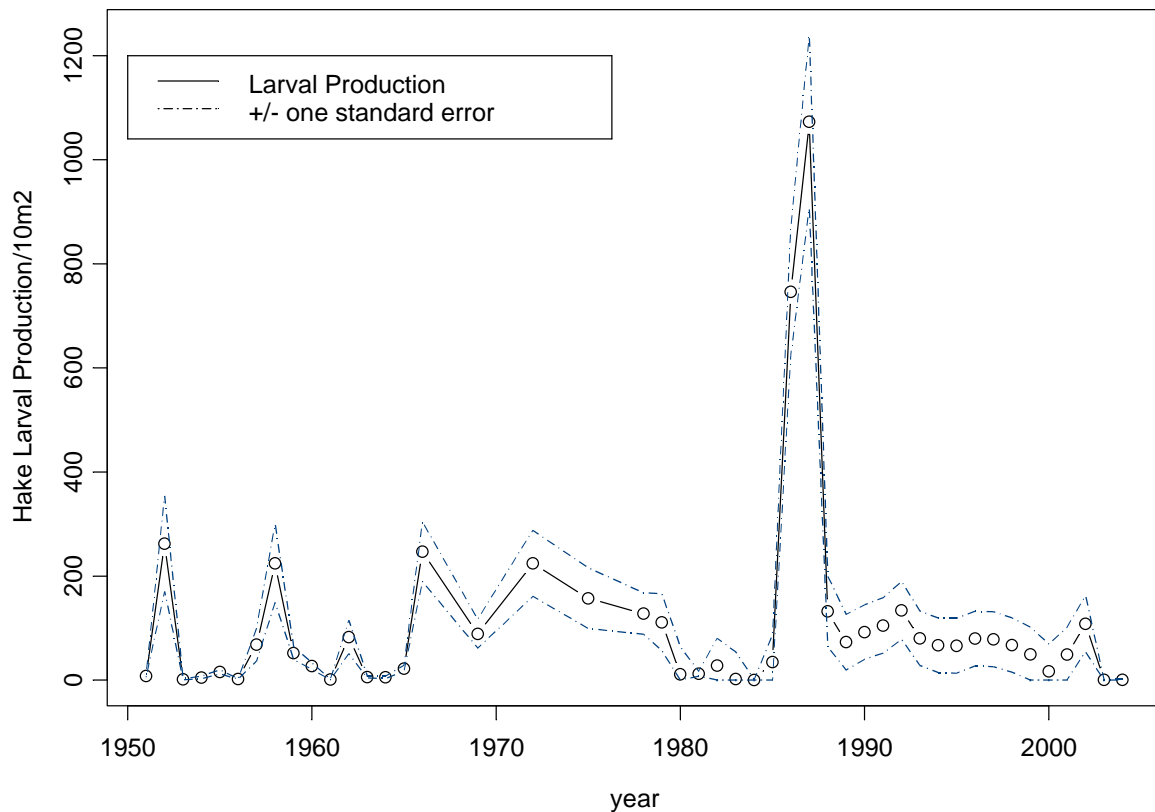


Figure 2. Time series of daily hake larval production /10m² from 1951-2004. The peak value was 1073/10m² in 1987.

Significance of accomplishment: This time series will be updated each year and will serve as a least biased index of hake abundance, which can be used as an input to an annual NWFSC stock assessment of hake and to estimate fraction of the stock migrating into Canadian waters. Thus these indices will contribute to the better understanding of the population dynamics and migration of hake.

Problems: None.

Contact: Nancy Lo, 858-546-7123